

Mathematical formulae for papers 1 and 2

Surface area and volume of solids

Name of solid	Total surface area	Volume
cone	$\pi r^2 + \pi r l$	$\frac{1}{3} \pi r^2 h$
pyramid		$\frac{1}{3}$ base area \times height
sphere	$4\pi r^2$	$\frac{4}{3} \pi r^3$

Trigonometry

Sine Rule $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Area of a triangle $= \frac{1}{2} ab \sin C$

MINISTRY OF EDUCATION, BOTSWANA
in collaboration with
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
Botswana General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER CANDIDATE NUMBER

MATHEMATICS

Paper 2

0563/02

October/November 2007

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments
Electronic calculator

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces provided at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on this question paper.

If working is needed for any question it must be shown below that question. Omission of essential working will result in loss of marks.

Do not use staples, paper clips, highlighters, glue or correction fluid.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 75.

If the degree of accuracy is not specified in the question and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.

In any question where the value of π is required, use the value from your calculator or take π as 3.142.

For Examiner's Use

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This document consists of 14 printed pages and 2 blank pages.



1 It is given that $m = t - cd$.

(a) Find the value of c when $m = 11$, $t = -3$ and $d = 4$.

Answer (a)..... [1]

(b) Express d in terms of m , c and t .

Answer (b)..... [2]

2 An electric cooker can either be bought for cash or through hire purchase.
The cash price is P3499 and the hire purchase price is a deposit of P350 followed by 24 monthly instalments of P171 each.

Balori buys the cooker on hire purchase.

(a) Calculate the total amount of money that he pays for the cooker.

Answer (a) P..... [2]

(b) How much money would he have saved if he bought it for cash?

Answer (b) P..... [1]

3 The mass of a puppy was 1.5 kg at birth.

(a) At the end of the first month the mass of the puppy had increased by 28%.

Calculate the mass of the puppy at the end of the first month.

Answer (a).....kg [2]

(b) At the end of the second month, the mass of the puppy had increased such that it was now 15% more than that at the end of the first month.

(i) Calculate the mass of the puppy at the end of the second month.

Answer (b)(i).....kg [2]

(ii) What is the percentage increase in its mass since birth?

(b)(ii)..... [2]

4 Thato saves P5 in the first month, P8 in the second month, P11 in the third month, P14 in the fourth month, and continues with the same pattern up to twenty four months.

(a) How much money will Thato save in the fifth month?

Answer (a) P..... [1]

(b) Calculate the total amount of money that Thato would have saved in the first five months.

Answer (b) P..... [2]

(c) Describe, in words, the pattern of Thato's monthly savings.

Answer (c)..... [1]

(d) Write an expression, in terms of n , for the amount of money saved in the n th month, where n is such that $1 \leq n \leq 24$.

Answer (d) P..... [2]

(e) How much does he save in the last month?

Answer (e) P..... [1]

5 A drum is filled completely with 135 kg of oil. The density of oil is 0.9 g/cm^3 .

(a) What is the capacity of the drum in

(i) cm^3 ,

Answer (a)(i)..... cm^3 [2]

(ii) litres.

Answer (a)(ii)..... litres [1]

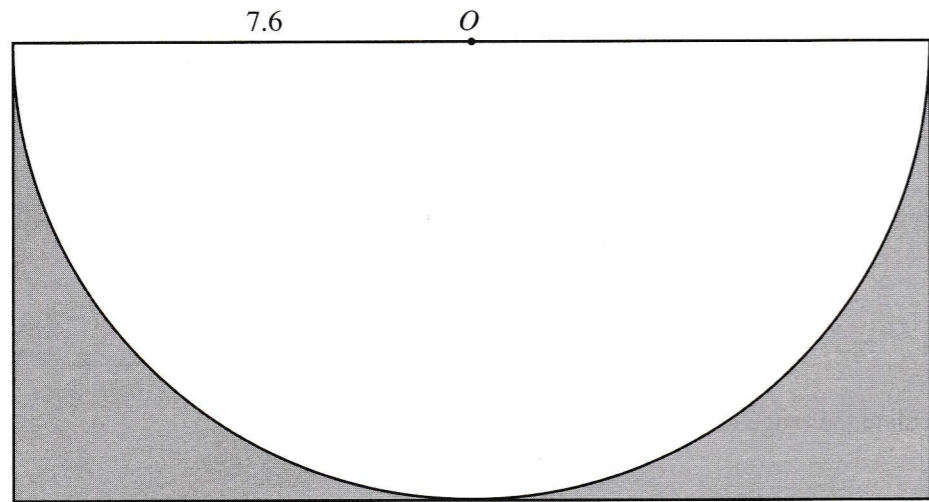
(b) The oil is shared by a group of people. Each person gets 25 litres. How many people are in the group?

Answer (b)..... [2]

6 The distance, d , between Gaborone and Molepolole is 50 km correct to the nearest 5 km. Complete the statement below for the distance d .

..... km $\leq d <$ km [2]

7 The diagram shows a semicircle, centre O , inscribed in a rectangle.
The radius of the semicircle is 7.6 cm.



Calculate the area of

(a) the rectangle,

Answer (a)..... cm² [2]

(b) the semicircle,

Answer (b)..... cm² [2]

(c) the shaded part.

Answer (c)..... cm² [2]

8 The table below shows the number of points obtained by a group of 30 candidates in the BGCSE examination.

Number of points	Number of candidates
35	4
36	6
37	7
38	8
39	3
40	2

(a) Calculate the range of the number of points.

Answer (a)..... [1]

(b) Find the median number of points.

Answer (b)..... [1]

(c) Calculate the mean number of points.

Answer (c)..... [3]

(d) Those candidates who obtained at least 38 points were admitted at an institution of higher learning.

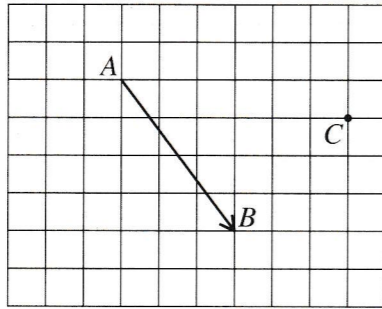
(i) How many candidates in the group were admitted?

Answer (d)(i)..... [1]

(ii) A candidate is chosen at random from the group.
Find the probability that the candidate will **not** be admitted.

Answer (d)(ii)..... [1]

9 The diagram shows vector \vec{AB} and a point C .



(a) Express \vec{AB} as a column vector.

Answer (a)..... [1]

(b) $\vec{CD} = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$.

On the grid above represent the vector \vec{CD} by a line segment.

[1]

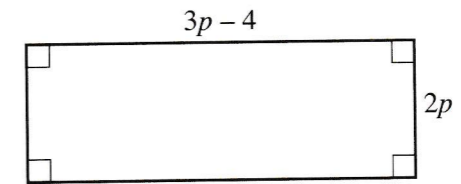
(c) Work out $\vec{AB} - \vec{CD}$.

Answer (c)..... [1]

(d) Calculate the magnitude of \vec{CD} .

Answer (d)..... [2]

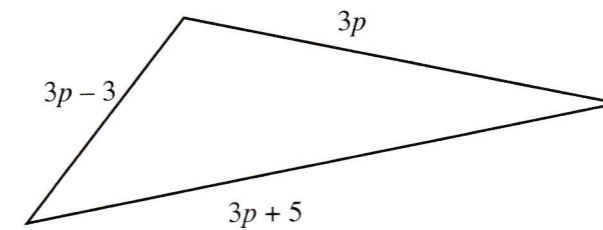
10 The diagram shows a rectangular plot with length $(3p - 4)$ metres and width $2p$ metres.



(a) Write down an expression, in terms of p , for the perimeter of the plot.

Answer (a)m [1]

Another plot is triangular and has sides measuring $3p$ metres, $(3p - 3)$ metres and $(3p + 5)$ metres as shown in the diagram below.



(b) Write down an expression, in terms of p , for the perimeter of this plot.

Answer (b)m [1]

(c) The perimeter of the rectangular plot is equal to that of the triangular plot.

(i) Form an equation in p to show this information.

Answer (c)(i)..... [1]

(ii) Solve the equation formed in part (c)(i) to find the value of p .

Answer (c)(ii) $p =$ [1]

(iii) Write down the length of the longest side of the triangular plot.

Answer (c)(iii).....m [1]

11 A straight line, l , passes through the points $P(4, 3)$ and $Q(-2, 6)$.

(a) Find the equation of the line l .

Answer (a)..... [2]

(b) Calculate the distance between P and Q .

Answer (b)..... [2]

(c) Find the coordinates of the mid-point of the line segment PQ .

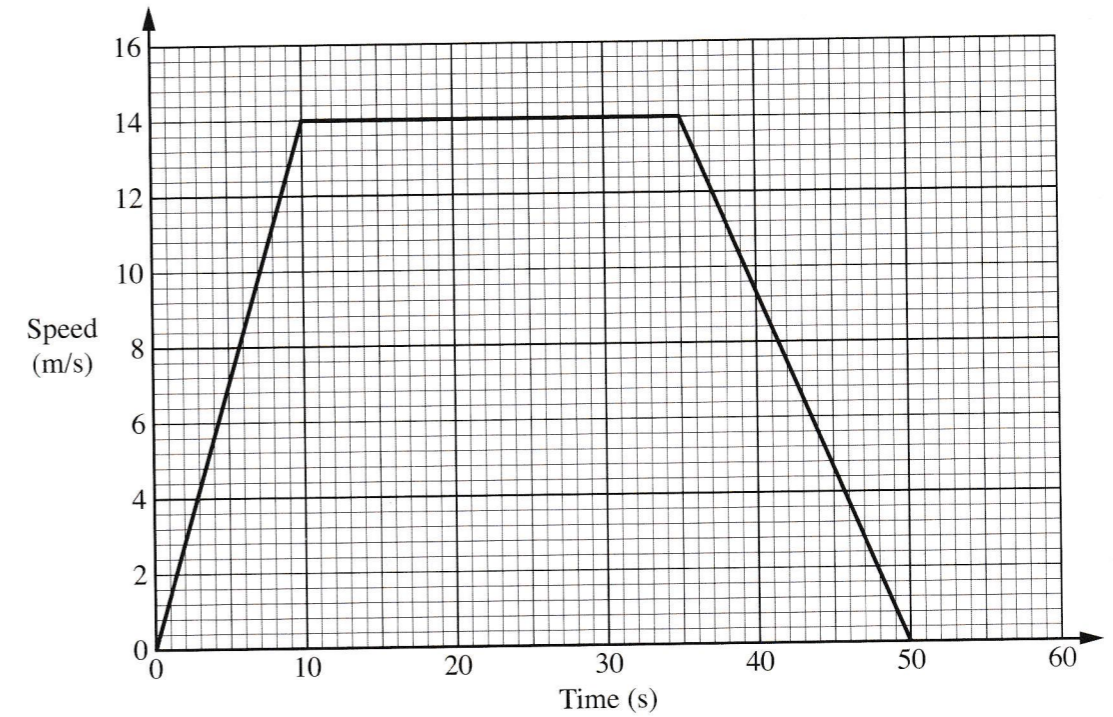
Answer (c) (.....,) [2]

(d) R is another point on l such that $PQ = QR$.

Find the coordinates of R .

Answer (d) (.....,) [2]

12 The diagram shows the speed-time graph of a train over a period of 50 seconds.



(a) Write down the highest speed the train reached in 50 seconds.

Answer (a).....m/s [1]

(b) Calculate

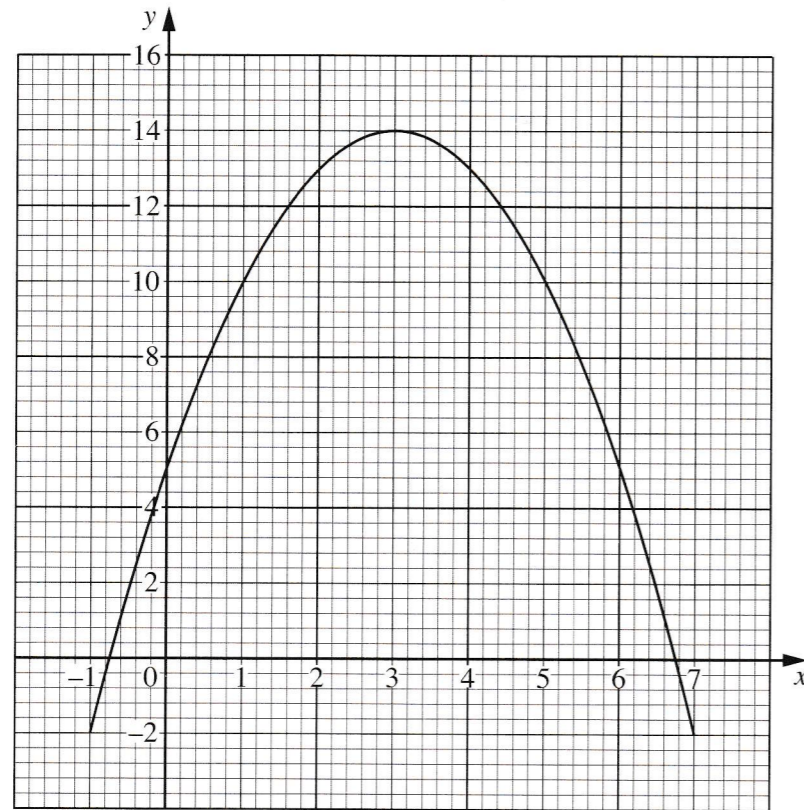
(i) the acceleration of the train during the first 10 seconds,

Answer (b)(i).....m/s² [2]

(ii) the distance covered by the train in the 50 seconds.

Answer (b)(ii).....m [2]

13 The diagram shows the graph of $y = 5 + 6x - x^2$ for $-1 \leq x \leq 7$.



(a) On the same axes draw the line $y = x + 6$. [2]

(b) Use the diagram to find the values of x satisfying the equation

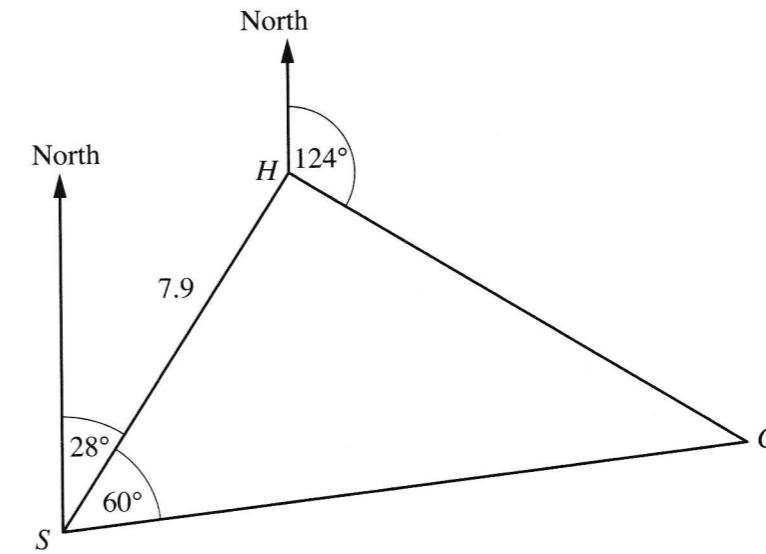
(i) $5 + 6x - x^2 = x + 6$,

Answer (b)(i)..... [2]

(ii) $2 + 6x - x^2 = 0$.

Answer (b)(ii)..... [2]

14 The diagram below shows the positions of a school, S , a club, C , and Basadi's home, H . H is 7.9 km from S on a bearing of 028° . C is on a bearing of 124° from H and $\hat{C}SH = 60^\circ$.



(a) Find the bearing of H from C .

Answer (a)..... [2]

(b) Calculate $\hat{S}CH$.

Answer (b)..... [2]

(c) How far is the club from Basadi's home?

Answer (c).....km [3]